84. (New) An exposure apparatus according to Claim 45, wherein said predetermined condition includes an irradiation time of said exposure light on said optical system, an exposure light intensity and an irradiation amount.

85. (New) An exposure apparatus according to Claim 46, wherein said exposure condition includes at least one of an illumination condition to illuminate a mask on which said pattern is formed, a transmittance of the mask on which said pattern is formed, a minimum line width of said pattern, and a permissible exposure amount error.

REMARKS

Favorable reconsideration of this application, in view of the following comments and as presently amended, is respectfully requested.

Claims 1, 4-6, 14-21, 23, 24, 28-35, 40-42, 44-46, 49-52, and 54-85 are pending in this application. Claims 22 and 53 are cancelled and Claims 69-85 are added by the present response. Claims 1, 4, 5, 6, 49, 59, and 60 were objected to for informalities. Claims 1, 4, 5, 6, 49, 59, and 60 were rejected under 35 U.S.C. § 112, second paragraph. Claims 1, 4-6, 14-24, 28-35, 40-42, 44-46, 49-63, 66, and 67 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. patent 5,721,608 to Taniguchi. Claims 64, 65, and 68 were objected to as dependent upon a rejected base claim, but were noted as allowable if rewritten in independent form to include all of the limitations of their base claims and any intervening claims.

Initially, applicants gratefully acknowledge the indication of the allowable subject matter in Claims 64, 65, and 68.

Addressing first the objection to Claims 1, 4, 5, 6, 49, 59, and 60, that rejection is traversed by the present response. More specifically, Claim 1 is amended by the present

response to delete the language noted as unclear. Thus, the above-noted objection is traversed.

Addressing now the rejection of Claims 1, 4, 5, 6, 49, 59, and 60 under 35 U.S.C. § 112, second paragraph, that rejection is traversed by the present response. The above-noted claims are amended by the present response to correct the language noted as indefinite by now initially reciting an "optical system" to provide clear antecedent support for any subsequent recitation to "said optical system". Thus, the above-noted rejected under 35 U.S.C. § 112, second paragraph, is traversed.

Addressing now the rejection of Claims 1, 4-6, 14-24, 28-35, 40-42, 44-46, 49-63, 66, and 67 under 35 U.S.C. § 102(b) as anticipated by Taniguchi, that rejection is traversed.

It is initially noted that certain of the claims are amended by the present response to clarify features recited therein. Specifically, independent Claim 1 now recites an initial step of "setting a time interval..." and "changing said time interval for measurement in accordance with an exposure condition for transferring said pattern of said mask onto said substrate". Certain other independent claims are amended to recite similar features.

Taniguchi is directed to a structure for obtaining an incident energy of illumination light incident on a projection optical system through a reticle in accordance with a relative position of the reticle and a slit-shaped illumination area, and correcting the imaging characteristic of the projection optical system based on the incident energy that is changed in accordance with the relative position. In the structure of Taniguchi since a reticle transmittance η is obtained for each scanning position of the reticle, a magnitude of an output Sc1 from a radiation amount sensor 41 is sequentially read in accordance with the coordinate position of the reticle interferometer. Similarly, the magnitude of the output Sa from the photoelectric sensor 28 is read, and then a ratio Sc1/Sa is calculated and stored in the

memory. In that structure the storing is performed at intervals corresponding to a predetermined moving amount with reference to a resolving power of the reticle interferometer (i.e., a position interval, or a time interval at which no problem is posed in terms of an error in the calculation precision of a variation in magnification).

Further, Taniguchi describes a structure for replacing information about a variation characteristic of the imaging characteristics every time an illumination condition is changed upon the replacement of an aperture stop 29.

The structure and operation in Taniguchi, however, differ from the claims. Specifically, Taniguchi does not teach or suggest an operation for "changing said time interval for measurement [of a transmittance of said optical system] in accordance with an exposure condition...", as recited in independent Claims 1 and 24. Therefore, independent Claims 1 and 24, and the claims dependent therefrom, patentably distinguish over the teachings in Taniguchi.

Moreover, independent Claims 6, 14, 42, and 46 recite similar limitations as noted above with respect to independent Claims 1 and 24, and thus those claims also distinguish over the teachings in Taniguchi.

With respect to independent Claims 16 and 44, Taniguchi does not teach or suggest "changing said time interval for measurement in accordance with the comparison result of a variation of a first measurement of a light amount and a variation of a second measurement of said light amount".

With respect to independent Claims 19 and 45, Taniguchi does not teach or suggest an operation for "determining a transmittance time-varying prediction function of said optical system in consideration of said predetermined condition", and wherein the predetermined condition is upon a "self-cleaning"

Further, dependent Claim 29 even further distinguishes over the teachings in Taniguchi as Taniguchi does not teach or suggest a control structure that can "set said transmittance measurement interval of said transmittance measurement unit in accordance with a variation amount between a transmittance obtained by a most recent transmittance measurement and a transmittance obtained by a measurement performed before said most recent measurement".

With respect to independent Claim 42, Taniguchi does not teach or suggest a structure to "change the time interval in accordance with an exposure condition for transferring said pattern onto said substrate".

With respect to independent Claim 46, Taniguchi does not disclose or suggest a structure to "change said time interval of said measurement unit in accordance with said any exposure condition selected by said selection unit".

In such ways, each of the above-noted claims, and the claims dependent therefrom, patentably distinguish over the teachings in Taniguchi.

The present response also sets forth new Claims 69-85 for examination, which are also believed to be allowable. Each of new Claims 69-85 is a dependent claim that depends from the independent claims discussed above as distinguishing over the teachings in Taniguchi. Thus, new dependent Claims 69-85 are also believed to be allowable.

As no other issues are pending in this application, it is respectfully submitted that the present application is in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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IN THE CLAIMS

Please amend Claims 1, 4-6, 14, 16, 23, 24, 42, and 46 as follows:

--1. (Thrice Amended) An exposure method [performed by an exposure apparatus] to transfer a pattern of a mask illuminated with exposure light from a light source onto a substrate through an optical system, said method comprising:

setting a time interval for measurement of a transmittance of said optical system;

changing said time interval for measurement in accordance with an exposure condition for transferring said pattern of said mask onto said substrate;

[photodetecting a part of said exposure light in an optical path of said exposure light;

setting a time interval for measurement of a transmittance of said optical system which is arranged between a position of photodetecting a part of said exposure light and said substrate in accordance with change in exposure conditions;]

measuring a transmittance of said optical system at said [set] changed time interval for measurement;

setting an exposure amount control target value in accordance with said measured transmittance of said optical system; and

transferring said pattern onto said substrate through said optical system, while an exposure amount is controlled based on a photodetection [results] result of a part of said

exposure light photodetected between said light source and said mask and said set exposure amount control target value.

4. (Twice Amended) An exposure method according to Claim 1, wherein said exposure condition includes a transmittance of [a] said mask.

5. (Twice Amended) An exposure method according to Claim 1, wherein said exposure condition includes one of a minimum line width of said pattern and a permissible exposure amount error.

6. (Thrice Amended) An exposure method [performed by an exposure apparatus] to transfer a pattern of a mask illuminated with exposure light from a light source onto a substrate through an optical system, said method comprising:

setting a time interval for measurement of a transmittance of said optical system;

[photodetecting a part of said exposure light in an optical path of said exposure light;

setting a time interval for measurement of a transmittance of said optical system which is arranged between a position of photodetecting a part of said exposure light and said substrate] changing said time interval for measurement in accordance with a variation amount of a transmittance of said optical system;

measuring a transmittance of said optical system at said changed time interval for measurement;

setting an exposure amount control target value in accordance with said measured transmittance of said optical system [at said set time interval for measurement]; and

transferring said pattern onto said substrate through said optical system, while an exposure amount is controlled based on a photodetection [results] result of a part of said exposure light photodetected between said light source and said mask and said set exposure amount control target value.

14. (Thrice Amended) An exposure method to illuminate a mask with exposure light from a light source and transfer a pattern of the mask [illuminated with exposure light from a light source] onto a substrate through an optical system, said method comprising:

setting [a time interval] time intervals for measurement [in accordance with each of at least two exposure conditions; and] in respect to at least two exposure conditions for transferring said pattern of said mask onto said substrate, each of said time intervals for measurement being different from one another;

setting one exposure condition of said at least two exposure conditions; and

measuring [a variation in] the amount of said exposure light which passes through said optical system and reaches onto said substrate at said [set] time interval for measurement that corresponds to said set exposure condition.

16. (Twice Amended) An exposure method to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said method comprising:

measuring a variation in the amount of said exposure light passing through said optical system [in] at a predetermined time interval for measurement; and

changing said [predetermined] time interval for measurement [upon said measuring,] in accordance with a comparison result of a variation of a first measurement of said light amount and a variation of a second measurement of said light amount.

22. (Cancelled).

23. (Amended) An exposure method according to [Claim 22] Claim 14, further comprising:

obtaining a transmittance of said optical system in accordance with an amount of said exposure light which is measured before passing through said optical system, and said measurement result of said exposure light passing through said optical system.

24. (Thrice Amended) An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate, said exposure apparatus comprising:

a branch optical system arranged in an optical path of said exposure light to branch a part of said exposure light;

an optical system arranged between said branch optical system and said substrate;

a transmittance measurement unit to measure a transmittance of said optical system at a predetermined time interval;

a control unit connected with said transmittance measurement unit to [set a time interval for measurement of said transmittance measurement unit] change said time interval in accordance with an exposure condition for transferring said pattern onto said substrate;

an exposure amount setting unit connected with said transmittance measurement unit to set an exposure amount control target value in accordance with [said measured] a transmittance of said optical system that is measured by said transmittance measurement unit at said changed time interval; and

an exposure amount control system connected with said exposure amount setting unit to control an exposure amount based on said set exposure amount control target value [; wherein

said transmittance measurement unit measures a transmittance of said optical system at said set time interval for measurement].

42. (Thrice Amended) An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate, said exposure apparatus comprising:

a branch optical system arranged in an optical path of said exposure light to branch a part of said exposure light;

an optical system arranged between said branch optical system and said substrate;

a first sensor arranged in the optical path of a part of said branched exposure light to photodetect a part of said exposure light;

a second sensor arranged substantially flush with said substrate to photodetect said exposure light passing through said optical system;

a measurement unit connected with said first sensor and said second sensor to measure a variation in an amount of exposure light passing through said optical system at a predetermined time interval, based on an output signal from said first sensor and an output signal [form] from said second sensor; and

a control unit connected with said measurement unit to change [a] said time interval [of a measurement performed by said measurement unit] in accordance with [change in] an exposure condition for transferring said pattern onto said substrate.

46. (Thrice Amended) An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising:

a measurement unit to measure an amount of exposure light passing through said optical system and reaching onto said substrate at a predetermined time interval;

a selection unit to select any exposure condition among a plurality of exposure conditions for transferring said pattern onto said substrate; and

a control unit to change said time interval of said measurement unit in accordance with said any exposure condition selected by said selection unit [connected with said

measurement unit to set said time interval of a measurement performed by said measurement unit in accordance with an exposure condition].

53. (Cancelled).

Claims 69-85 (New).--